

**POLICY IMPLICATIONS OF NUMBER ASSIGNMENT AND PORTABILITY:
NUMBER PORTABILITY IN THE OECS – COSTS AND BENEFITS**

**REPORT TO THE EASTERN CARIBBEAN TELECOMMUNICATIONS AUTHORITY
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INTRODUCTION

This paper, prepared pursuant to Task 7 of USAID Contract No. PCE-I-00-98-00014-00, discusses the policy implications of number assignment and portability for the Board of the Eastern Caribbean Telecommunications Authority (ECTEL) and the national commissions of the ECTEL member states, with the aim of providing regulators in the member states with information so that they may make informed choices about the implementation of number portability (NP).¹

Specifically, this paper presents a cost-benefit analysis regarding the implementation of NP in the countries of the Organization of Eastern Caribbean States (OECS), separately describing the costs and benefits of implementing NP with respect to landline and wireless carriers, consistent with the way these issues have been addressed by most regulators worldwide. This paper attempts to describe the factors that will affect both the costs and the benefits that the implementation of NP can present. As described in more detail below, by considering these factors in light of local carrier, consumer, and competitive conditions, OECS regulators can make a reasoned decision regarding the implementation of NP in the OECS member countries. We also will be happy to consult further on this issue once on-site visits have been made and additional information has been gathered.

¹ We addressed other issues related to number assignment in an earlier paper providing advice on ECTEL-prepared documents outlining guidelines for numbering resource management and uniform dialing plans. [Insert citation to the document that transmitted to ECTEL the October 12, 2001, memo from Keller to Otto critiquing "Guidelines for the Management of the Numbering Resources in the OECS," "Uniform Dialing Plan for the OECS," and "Numbering in the OECS (Seminar Presentation)"]

I. Executive Summary

NP is a technology that can be implemented by carriers that allows customers to retain their telephone numbers when changing from one service provider to another. NP usually refers only to the ability of customers to retain their telephone numbers while switching carriers at the same location, and does not refer to the ability to retain a number upon moving or changing location.² NP can be implemented by landline carriers and also by wireless carriers. Many regulators have viewed the implementation of NP as an important part of market liberalization. The decision to implement NP must be made carefully, however, in light of the factors and conditions laid out in this paper.

The implementation of NP in the OECS has the potential to bring considerable benefits, and will also impose certain costs. The deployment of NP technology would allow customers to avoid the “transaction cost” involved when they change carriers in order to benefit from more attractive services and/or prices offered by competitors to the current carrier. As a result, NP allows competing carriers more easily to win customers away from each other and, presumably, promotes competition among competing carriers. At the same time, however, NP technology is costly and imperfect. Carriers’ costs to implement the technology must generally be borne by subscribers, and imperfections in the portability technology can cause port transactions to fail in a variety of ways.

As a result, implementation of NP can raise the price of service, and potentially degrade service quality. A regulator’s decision as to whether NP should be mandated

² The ability to retain a telephone number when moving or changing location is referred to as “geographic portability.” Although it is a service viewed as desirable by some customers, geographic portability is not generally viewed as having competitive implications.

in a particular region will depend upon conditions specific to the carriers and marketplace in that region.

II. Number Portability for Landline Carriers

As noted above, NP is the ability of a customer to retain, at the same location, a telephone number when changing service providers. The benefits and costs that NP presents are outlined in this section.

A. Benefits and Advantages of Number Portability for Landline Carriers

NP has been mandated for landline carriers most often as a means of stimulating competition. Typically, NP is implemented as part of an overall telecommunications liberalization plan, and regulators express the belief that the ability to retain one's telephone number will lower barriers to customers' switching carriers.

From a telecommunications liberalization perspective, the competitive benefits of number portability are twofold. First, NP is viewed as an important part of the initial stage of opening a telecommunications market to competition. Regulators tend to believe that the initial implementation of competition requires enhancing the ability of customers to switch from the incumbent carrier to its new competitors. Second, NP is viewed as part of the regulatory landscape of a more mature competitive market. In this context, NP is generally believed to facilitate competition among carriers in a multi-carrier environment.

Viewed either way, consumers presumably benefit from NP because it enables them more easily to switch carriers when they have market reasons to do so. In a

competitive market, it is generally believed that this provides benefits to carriers as well as to customers.

Benefits to Consumers. The availability of NP allows customers to switch carriers and avoid both the direct and indirect costs associated with changing their telephone numbers. Direct costs of changing telephone numbers include the costs of reprinting stationery, business cards, and advertising materials, for business users, and the time and trouble associated with informing clients, business associates, friends, and family members of the new number for all users. Indirect costs include such things as lost goodwill associated with customers or associates who, for whatever reason, may lose contact because of the changed number. A calling party that is unable to reach a user because its phone number has changed also suffers some cost. For business users that rely heavily on the telephone, the direct and indirect costs of changing numbers can be substantial.

The ability to avoid the costs of switching carriers, in turn, facilitates customers' ability to take advantage of better deals from other carriers. These benefits may include lower prices, higher service quality, or better customer service. In essence, NP allows a telephone customer to take advantage of a competitor's better deal without facing the "transaction cost" of having to change its telephone number. In economic terms, NP thus increases consumer welfare.

Benefits to Carriers. By reducing the transaction costs to consumers of switching carriers, NP improves the ability of carriers to attract new customers. NP makes it easier to convince customers of the value proposition of switching providers. Assuming

no other costs of changing carriers,³ without NP, a carrier must provide a benefit in cost, quality, or service that exceeds both its competitors' offers and *a*lso outweighs the customer's cost of changing numbers. In contrast, with NP, a carrier must merely improve upon its competitor's offer. New entrants in telecommunications markets derive especially great benefit from NP because they generally seek to win customers away from an incumbent carrier, but NP is generally regarded as having benefits for all carriers in a mature competitive market.

B. Costs and Disadvantages of Portability for Landline Carriers

The benefits of NP do not come without their costs and disadvantages. The most obvious cost of NP is represented by the capital expenditures by carriers that are required to implement NP technology. These costs are very specific to the carriers and localities involved, and depend on such factors as the type of number portability technology that is implemented, the number of subscribers over which a carrier can spread its investment, and the nature of contracts between the carriers and switch and software vendors. These costs are borne in the first instance by carriers but, like all costs of doing business, are generally passed on to consumers. If carriers are allowed to recover them only from customers that port their numbers, the cost of portability could be prohibitively high. On the other hand, if carriers recover these costs from their entire customer base, the cost of service is increased for all users.

NP can be implemented in a number of ways and, in the various nations that that have required NP, regulators have used different methods. NP implementations fall into two broad categories:

³ Other costs to change carriers may exist, however, such as the cost of purchasing a new wireless handset if the new and old carriers use different mobile technology.

- (1) central database implementations, and
- (2) network-based implementations.

In addition to selecting the broad type of NP implementation, a regulator that has determined to order NP implementation must consider whether to require that a particular methodology is to be mandated, and if so, what that should be. In Hong Kong, for example, the regulatory body specified the precise technological process that carriers must use in the network-based implementation of NP. In contrast, in the United States, where the regulator chose long-term NP implementation based on a database method, it did not select the specific technology to be used. Rather, the FCC set specific performance criteria for NP and left it to the industry to select the implementation. Also, the FCC allowed carriers to utilize “interim” non-database methods in the early stages of the implementation until database technology could be deployed.

Network-based implementations are generally less technically complex. At their simplest, they involve call-forwarding arrangements between carriers. Calls to ported numbers are forwarded by the former carrier using standard network call-forwarding technology, usually to a “phantom” number at the new carrier. These network-based arrangements have the advantage of being simple, in the sense that they do not require carriers to implement new network functionalities or technology. They have the disadvantage, however, of being more cumbersome. For example, the use of call forwarding for NP usually prevents the carrier from offering a call forwarding feature to the customer (as that feature is already being used in the network to effectuate the port). A call-forwarding arrangement also requires the continued involvement of the

former carrier in the completion of calls to the customer after the customer has switched to a new carrier. In addition, the need for a “phantom” number at the new carrier to which the calls are forwarded results in unnecessary use of telephone numbers. In general, the regulators that adopted NP in the early 1990s (such as Hong Kong) selected these more readily achievable network-based implementations. Although these arrangements seem to have worked reasonably well, all of these countries have made or plan to make a transition to a database method.

Regulators ordering implementation more recently (such as the United States) have generally chosen to implement NP through central database methods. These methods involve the establishment of a central NP database of routing information for ported numbers which carriers query, usually using advanced intelligent network (AIN) technology, in order to complete calls.

If a database method is selected, the costs of the database and its administration must also be considered. Generally, an administrator must be named to manage the NP database. This function is similar to the function of numbering plan administration or central office code administration. The administrator must be able to manage a large, dynamic database that interfaces with carriers’ networks and routing functionalities. The database system itself also must be created and maintained. Because such databases are already being administered in other NANP countries,⁴ it may be possible to benefit from the resulting economies of scale by employing the same administrator in the OECS. In any event, the costs of the database and administrator must generally be

⁴ The United States and Canada have each selected number pooling administrators pursuant to term contracts. Both countries currently are using NeuStar, Inc., as their NP administrator (“LNPA”).

borne by the telecommunications industry. Frequently, they are recovered from customers pursuant to a cost-recovery mechanism approved by the regulator.

Because of number portability mandates in Canada and in the United States, the major North American switch manufacturers already have developed generally available “generic” software upgrades that include NP functionalities. To the extent that carriers in the OECS utilize such switches, the acquisition of the necessary software for switch upgrades will not greatly exceed the cost of a standard generic upgrade. Although this is not the only network modification carriers will need to make, it is a significant one. In addition, carriers must establish inter-carrier communications systems to process porting transactions. These systems must ensure proper validation of a proposed port with the customer and the current carrier, as well as orderly communication between the carriers and the number portability administrator.

Carriers also must expend capital to update other systems that will be affected by the implementation of portability, such as billing, number inventory and customer care. Billing and number inventory systems must be updated to account for the fact that new customers will not necessarily be assigned numbers out of the carrier’s inventory, but might instead bring their numbers with them. Customer care personnel must be trained to understand the number portability process and deal with potential problems that may arise.

Another cost of implementing NP involves the potential it creates for network reliability problems, especially during and shortly after the initial implementation. Whatever NP architecture is selected, carriers have to update multiple systems to enable NP. Where a more primitive, network-based system is used, carriers must have

the personnel in place to handle manual porting requests, and ensure that the manual programming functions properly. Where a database system is implemented, carriers must have the automated inter-carrier communications systems in place to ensure that ports run smoothly. Despite carriers' best efforts, no task of this magnitude can ever be accomplished without incident. For example, in the United States today a significant number of number porting transactions (above 5 percent) fail or are defective in some way. These failed ports can result in customers' carrier changes not being effectuated, dropped calls, and numbers that are unable to receive calls. These circumstances also result in costs to customers, as well as additional costs to carriers to fix the problems. Thus, the inherent failure rate in the implementation of any technology of the magnitude of NP itself imposes a cost on carriers and consumers.

Because the costs of implementing NP are variable and specific to a given carrier and market, regulators are well-advised to solicit as much information as possible to inform their choices in this area. Most regulators seek implementation cost data from a variety of sources. Data obtained directly from the carriers are generally very useful, but their accuracy must be considered in light of any motivations the carriers may have to promote or discourage NP. In some instances, regulators have hired economic and engineering consultants to help determine implementation costs. For example, OFTA, the telecommunications regulator in Hong Kong, commissioned the British consultants National Economic Research Associates (NERA) to perform a cost-benefit analysis of the specific costs of implementing NP in Hong Kong.

In order to make a decision about whether NP should be mandated for landline carriers in the OECS member countries, regulators will need to consider all of the

factors discussed in this paper in light of specific local conditions. Given present information, we are unable at this time to present a concrete recommendation in this regard, but will be happy to consult further with ECTEL regulators as on-site visits are made and more information is gathered.

III. Number Portability for Wireless Carriers

ECTEL and the member states must also face the question of whether to require wireless carriers to implement NP. The cost-benefit analysis applicable to wireless carriers raises very similar issues to those raised in the landline context. In general, the competitive benefits must be weighed against the costs. The circumstances of the wireless market may, however, be different. For example, whereas an incumbent landline provider with significant market power exists in most countries, many countries have always licensed multiple, competing wireless providers, such that no one provider may have significant market power. In such a case, the NP benefit of facilitating movement of customers away from the incumbent provider to new competitors may not have as much weight.

Although the policy issues surrounding the benefits of wireless NP may be similar to the landline issues, the technical issues are frequently different. Simply stated, wireless networks are fundamentally different from landline networks, and they may face different technical challenges to implement NP technology. In large part, the inherently mobile nature of wireless service drives the differences. For example, wireless carriers in many countries incorporate features that allow subscribers from one carrier's system to leave their own carrier's coverage area and "roam" onto another carrier's system, expanding the coverage area available to the customer. Roaming

technology requires the ability to identify roaming subscribers and their home carrier for billing purposes. The obvious way of doing this is using the telephone number, identifying the carrier by the block of numbers in which the customer's number falls. NP complicates this approach, however, because it allows customers to take numbers that were originally assigned to one carrier and port them to another carrier. For example, in the United States the wireless routing technology that had been implemented in the 1980s and early 1990s used the first six digits (the NPA-NXX) of a roamer's telephone number to identify the customer's home system. In order to implement wireless NP, carriers have pointed out that they will have to implement a different routing technology, which requires fundamental operational changes that are costly and difficult.

Because of the mobile nature of wireless service, difficult questions can arise about when it is possible to port a number. In some cases, if the old carrier and the new carrier do not have interconnection facilities in the same area for call rating purposes, portability may not be possible. In that case, the transaction would be the equivalent of porting a landline number to a different geographic location. As noted above, number portability as generally implemented only requires carriers to be able to port a number *at the same location* to another carrier. This is easy to understand in the landline context, but more difficult to grasp – particularly for end users – in the mobile context. From the carriers' perspective, however, this means that carriers must have systems in place to identify proposed porting transactions that cannot be completed. Customer service representatives must also be trained to understand this information and explain it, if necessary, to prospective customers.

As with landline NP, then, it is very important for OECS regulators to weigh the specific facts relative to the wireless market in the member countries to determine whether wireless NP should be implemented.

In the event that regulators choose to implement wireless NP in the OECS member states, it will also be necessary to decide whether NP should be required between landline and wireless carriers. The argument could be made that the goal of a fully competitive telecommunications marketplace militates in favor of an environment in which customers can change carriers, including switching between landline and wireless carriers, and retain their telephone number. Generally, however, NP between landline and wireless carriers gives rise to additional regulatory and operational issues. For example, wireless carriers in some countries may have established a custom of activating service in a very short time, perhaps even allowing their new customers to leave the store immediately with an activated telephone. The need for intercarrier communication to port a number, however, may undermine these customer expectations.

In other cases, the decision as to whether to require landline-wireless NP depends upon factors related to the configuration of the wireless network. For example, in Europe, billing for wireless calls has been on a “calling-party-pays” basis – that is, the party calling the wireless subscriber pays the extra charge associated with the cost of a wireless call. To enable this approach to billing, most European countries’ numbering plans set aside certain blocks or types of numbers as wireless numbers, so callers can easily identify wireless calls for which they will be charged. In such a case, portability

between wireless and landline providers is impossible, because the numbering plan and billing scheme do not allow the two types of carriers to share numbers.

At this time, it is our understanding that the proposed dialing plan for the OECS does not contemplate separate numbering blocks for wireless carriers. Nevertheless, ECTEL and the national commissions should be aware of this issue as it develops numbering and spectrum policy. In any event, ECTEL will have to confront the issue of wireless-to-landline NP in making decisions about any eventual NP implementation.

IV. Balancing Costs and Benefits

The sections above describe the types of benefits and costs that NP can bring in a telecommunications marketplace. To determine whether ordering the implementation of NP in the OECS is advisable, ECTEL and the national commissions in the member states should consider the relative importance of these issues locally. Relevant issues include:

- What type of NP technology should be implemented in the OECS?
- How much will it cost carriers in the OECS to implement?
- If a database method is implemented, what will be the administration cost?
- How readily will the carriers be able to spread these costs over their customer bases?
- How much importance do customers (both residential and business) place on the ability to keep their numbers, relative to price?
- Is it anticipated that competitors will seek to win customers away from the incumbent carrier as opposed to serving previously unserved customers?

As noted above, the relative importance of these factors in implementing NP for landline service and wireless service may differ. Once ECTEL and member state

commissions have analyzed the issues described in this paper, it will be possible to make a reasoned decision about the implementation of NP for each type of technology. Also, we will be happy to consult further on these issues once on-site visits have occurred and additional information has been gathered.

CONCLUSION

Number portability could be an important part of market liberalization policy in the Eastern Caribbean, but its benefits and costs must be considered carefully. Decisions regarding whether to mandate implementation of NP by landline and wireless carriers in the OECS are complex, and they must include a balancing of the many factors identified in this paper, along with local conditions, to reach the correct outcome.